The ‘Alalā’s Journey

An Honors Thesis (HONR 499)

by

Ali Gehr

Thesis Advisor

Elizabeth Dalton

Ball State University

Muncie, Indiana

April 2020

Expected Date of Graduation

May 2020

Abstract

The ‘Alalā, or Hawaiian Crow, was declared extinct in the wild in 2002. The species is only found in the Hawaiian Islands. Through the efforts of researchers at the ‘Alalā Project, there are now over 125 birds in captivity, and 20 'Alalā have been released back into the wild since 2017. In May of 2019, several of the birds were seen building nests in the wild for the first time in almost 20 years. The conservation of species and their environment is very important in today’s world. The unique story of the ‘Alalā is not well known but is one of inspiration and hope. It shows that it is possible to help the species that are endangered. By writing a children’s book, this sense of inspiration and hope can be shared with the next generation.

Acknowledgments

I would like to thank Professor Elizabeth Dalton for all of her help and guidance for this project. Without her encouragement for both my writing and my drawing, this thesis would not be what it is today.

I would like to thank Dr. Kamal Islam for inspiring this project. Without him accepting me to the Hawai’i Field Biology of Distant Places course I would never have learned about the ‘Alalā.

I would like to thank both Fiona the Hippo and Thane Maynard at the Cincinnati Zoo and Botanical Garden for the book *Saving Fiona*. This book was the inspiration for the direction of this project and without it, I most likely would have simply written a straight, scientific research paper.

Contents

Process Analysis

My honors thesis has been something that I have been thinking about since I started my freshman year. It had always seemed like a daunting task that I would never be able to complete to the extent expected. When I heard about taking HONR 499 in a structured class format I became very excited because I knew that the structure was what I needed to be successful with this project. I was worried that my project would not be eligible for the class because it was based in biology, which was not one of Professor Dalton's specialties. Once I realized that since my project was more of a creative writing project than a biology project I applied as soon as I could.

My thesis was inspired by the book *Saving Fiona* by Thane Maynard. It is a picture book that tells the survival story of Fiona the baby hippo at the Cincinnati Zoo and Botanical Garden. Reading this book made me think of the story of the ʻAlalā. I first learned about the ʻAlalā in my class, "Exploring Conservation Biology in Hawai'i." The ʻAlalā, or Hawaiian Crow, is an endangered bird that is endemic to Hawai'i. They were declared extinct in the wild in 2002. At that time there were only nine birds in captivity. However, through human intervention, they now have a captive population of more than 125, and 20 birds have been released back into the wild. While there are differences between saving a species versus saving a single individual, both stories filled me with hope for the future.

As I was developing an idea for my thesis I was also taking "Conservation Biology" with Dr. Kamal Islam. The class was a great experience, but there were times when it was very depressing. We were learning about how many species are becoming extinct, how much the climate is changing, and how without intervention on a global level nothing would ever get better. Listening to all of the negative stories in that class made me realize that the success stories

should be shared and celebrated. It was then that I knew I wanted to write a children's book about the ʻAlalā so that their success could be celebrated in the same way as Fiona's.

Research Done

Learning about the ʻAlalā

The first part of my project, as with any project, was to research the main topic. I had first learned about the ʻAlalā while in Hawai'i as part of a class. While in Hawai'i, we were able to attend a presentation done by Rachel Kingsley, the ʻAlalā Education and Outreach Associate at the ʻAlalā Project. She gave a presentation detailing the efforts that the ʻAlalā Project was doing to restore the wild population. For research, I wanted to reach out to Ms. Kingsley to see if she would be willing to sit down for an interview. This would have given me a great source of primary information. I also wanted to ask during the interview if I could use photos taken at the Keauhou Bird Conservation Center to illustrate my book. Unfortunately, after contacting the organization several times, I was unable to get this interview. While this was disappointing, I knew that I had to find more sources detailing information about the ʻAlalā.

I first began looking for books about the ʻAlalā, but they were few and far between. The most recent, non-field guide book I could find about them was written in 2006. This helped to confirm that more books were needed about the ʻAlalā. Because there were limited books on the ʻAlalā, the majority of my research was found in scientific papers and government documents.

Corvus hawaiiensis, also known as the Hawaiian crow or ʻAlalā, is a member of the family Corvidae. This is the same family as ravens, crows, magpies, and jays. Their appearance is similar to the common raven that is found in North America, but they are smaller in size. They look like a raven and are called Hawaiian crow, but their closest genetic relative is the rook. The ʻAlalā is the only endemic extant member of the corvid family in the Hawaiian Islands. This

means that the species is still living and that they are the only found in Hawaii. Historically, there were five different species of corvids spanning the entire island chain, but the ʻAlalā is the only one remaining.

The average life span of the Hawaiian crow is eighteen years in the wild and twenty-eight years in captivity. Typically, they are 1.5 feet in length and weigh about 1 pound. As with many animals, males tend to be slightly larger than females. The ʻAlalā are omnivorous. Their diet mainly consists of fruit and insects but will also eat eggs of other birds, flowers, nectar, and dead animals. Their diet of fruit makes them important members of the ecosystem. They act as seed dispersers for many of the fruits that they eat. The decline in the ʻAlalā population has caused a decline in seed dispersal for many plants. A study done in 2012 found that ʻAlalā would eat and carry 14 different fruits, including several that lack known seed dispersers (Culliney, et al., 2012). The same study also showed that the hō'awa relies entirely on ʻAlalā ingestion for germination and that the germination of ʻōhelo and ʻoha kēpau seeds was increased when ingested by the ʻAlalā (Culliney, et al., 2012). Hō'awa is a type of tall shrub that is sometimes called the Hawaiian magnolia. Hō'awa has large dark seeds inside a hard-cased, bright orange fruit. These seeds and hard casing make it harder for smaller birds to eat and disperse seeds. These plants are currently endangered without their main seed disperser in the wild to help repopulation.

Like other corvids, the ʻAlalā have been observed to use tools in order to reach food. A study done in 2016 by Rutz, et al. looked at the spontaneous use of tools in captive ʻAlalā. They found that sexually mature adults were more likely to develop tool use. The ʻAlalā were observed extracting food from both vertical and horizontal crevices. The researchers also

observed that the ʻAlalā would exchange an unsuitable tool with a suitable one, modify plant material to create tools, and transport unsupplied sticks to the log.

The ʻAlalā holds cultural significance in addition to ecological significance. The word *ʻalalā* in Hawaiian translates to "to bawl, bleat squeal, cry; a talkative person; and a style of chanting" (U.S. Fish and Wildlife Service, 2009). The style of chant is one that is used to further project the voice. It can also be a term for a messenger in battle who calls out a chief's commands to his warriors and the cry of a baby ("FAQs," 2017). The ʻAlalā are considered sacred and thought to be family spiritual guardians (*ʻaumākua*). Before Europeans came to the Hawaiian Islands, the ancient Hawaiians would sometimes keep ʻAlalā in their homes as pets because of the belief that they were *ʻaumākua* ("Hawaiian Culture," 2017). They also were symbols of unpredictable things due to their dark color. If an ʻAlalā was seen or heard it was considered a warning sign to not continue. In addition, they were associated with *ʻanāʼanā*, Hawaiian dark magic.

ʻAlalā were historically found in the dry and semi-dry forests along the slopes of Mauna Loa and Hualālai volcanoes (U.S. Fish and Wildlife Service, 2009). These forests consisted of ʻōhiʻa and koa trees. The forests would provide a protected understory with many shrubs the ʻAlalā would then use as protection from the ʻIo, or Hawaiian Hawk.

The last breeding pair of ʻAlalā was last observed near South Kona in 2002, after which the species was declared extinct in the wild. As with many species on the Hawaiian Islands, the 'Alalā faced many threats that led to their extinction. With the arrival of more people to the Islands came the introduction of invasive species such as mosquitoes, feral cats, mongoose, rats, pigs, cattle, and sheep (U.S. Fish and Wildlife Service, 2009). Each of these animals helped contribute to the ʻAlalāʼs decline. The biggest threats were diseases such as avian malaria, avian

pox, and toxoplasmosis. Each of these was transmitted by mosquitoes or feral cats. Animals such as cattle, sheep, and pigs trampled and ate understory plants, which caused limited food and cover from predators. Large sections of forest were cleared to make way for ranches that these animals called home (U.S. Fish and Wildlife Service, 2009). Mongoose, rats, and feral cats would also prey on ʻAlalā eggs and chicks, leading to a decrease in reproductive success. All of these factors put too much pressure on the ʻAlalā's wild population and unfortunately caused us to lose them.

The process of reintroducing the ʻAlalā was one with many parts. A breeding population was first established in captivity from only nine specimens. They then had to be raised by humans wearing costumes to limit the chance they would imprint on humans. Survival skills such as food identification, foraging, and predator avoidance had to be taught to the birds so that they could survive on their own in the wild.

Learning to Write for Children

Much of the information concerning the ʻAlalā requires a sophisticated understanding of the natural world, complicating my ability to about this in a children's book. To aid in this endeavor, I found several books that explained how to write books for children. These books offered advice from how to decide the correct audience to write for, to what genre to write, to how to get your work published. These books had many useful points that I had not considered when I first began writing, the first being that I will not be able to put all of the information that I know on a subject into a single book. *How to Write a Children's Book and Get it Published* by Barbara Seuling pointed out that to write an accurate and factual book I would most likely need to have about three times the amount of material than what is being used. Seuling's book could be considered outdated since she includes detailed instructions as to how to use both a typewriter

and a word processor, but her information continues to hold true. The fact that I would know more than what I could ever put into a 30-page book was the first thing, and one of the hardest, that I had to learn.

These books were also helpful in explaining the process of writing a book, specifically where pictures were involved. They explained that authors of picture books are not expected to illustrate their own work. It pointed out that it could be helpful, as an author, to sketch out where words and pictures would go on pages. However, a publisher would never expect an author to turn in professional pictures with their manuscript submission. The author would most likely not even be expected to find an illustrator; the publisher would be the one to make these connections.

Developing the Story

The plan for my thesis was to write a children's book. The book would be written for children between the ages of 9-11. This age range was chosen because of a presentation done by a graduate student in my class on conservation biology. The presentation was about introducing conservation biology into an elementary school curriculum. Starting around fourth or fifth-grade children can comprehend the concepts presented to them. This is also when the concept of ecosystem interactions is introduced ("Ohio's Learning Standards," 2019). Conservation has to do with human interactions in the environment so it would go along with the standards presented in school.

The book was initially going to be illustrated using photographs. I had planned on obtaining these photos from the ʻAlalā Project. The ʻAlalā Project is a partnership between the US Fish and Wildlife Service, the state of Hawai'i Department of Land and Natural Resources, the State of Hawai'i Division of Forestry and Wildlife, and San Diego Zoo Global that is dedicated to restoring the Hawaiian crow to its native habitat ("About Us," 2017). I was

unfortunately not able to get in touch with them and as a result not able to use their pictures to illustrate my book. This caused another change in the direction of the book.

Through my research, I learned that as an author I would not be expected to provide my own illustrations, but I knew that to help myself visualize the book they would be necessary. I decided to attempt drawings for my book using my limited art skills. I looked up tutorials and step-by-step instructions specifically to draw a raven so that my ʻAlalā would look its best. I also used several pictures taken from the ʻAlalā Project's Facebook page as references to direct the illustrations. I had several pictures that I used as references that were taken during my time in Hawai'i. My own pictures were also used to help illustrate the fun fact section of the book.

Finding a Narrator

My final thesis was not what I pictured when I began developing it at the beginning of the semester. Throughout the development of my thesis, it has undergone many changes to make it into the product that is being submitted. My thesis plan was to write a nonfiction children's book about the ʻAlalā. That has stayed the same, but the format of the book has changed several times. My original plan was to have the book be completely informative. When I wrote the outline, it looked as if I were simply writing a research paper but with words that a fourth grader could understand. It did not involve the use of characters and was going to be illustrated using real photos. Looking at the outline I had written, not only was it a lot of information for a child to take in at once but it also was dry material that would not hold their attention. This led to the development of the character of Iolana, the ʻAlalā.

My story then became a third-person limited narrative through Iolana's eyes. This development made my story more interesting, but it also became more difficult for me to write. I wanted to keep it as realistic as possible while using the fictional bird. This meant that I could

not include the details of human care that I wanted. Since the goal of having the ʻAlalā in captivity is to release them into the wild, the birds must have as little human contact and interaction as possible. With that in mind, Iolana was not able to have knowledge of the purpose of something like a feeding station, a release aviary, or humans using puppets to feed chicks. This was all information that I wanted to include, which meant a new character had to be developed, this time one that was human. Nalani was then born.

This is when my story found its final narrator. I now had a scientist who worked at the facility. She would be able to watch Iolana as she grew up and explain things that were used to help the ʻAlalā. It was also at this point that I came up with a way to incorporate the facts that I thought were interesting and fun into the book without bogging down the story itself. The inspiration once again came from *Saving Fiona*. At the end of the book, there are several pages with quick facts about hippos that many people would want to know. I decided to use this idea to add more facts about the ʻAlalā and the Island of Hawai'i. I also wanted to add a glossary in the back where I could define terms like "captivity" and "predator." These are terms that a child might not know but would be common language in the field of biology. It also gave me a place to elaborate on the part that introduced predators play in the dynamics of the Hawaiian ecosystem.

Finding the Characters

As I mentioned earlier, I did not come into this project with the original intent to have characters in my book. As my book developed, I began to recognize their need and place in the book. I knew that when I decided to have characters, I wanted them to be female. This is partly because I am female, but I also wanted young girls to see a female research scientist. Women

tend to be less represented in the field of science and I wanted to contribute to the portrayal of women in science.

Iolana was the first character that I decided to develop. Finding a name for her was a difficult decision for me. Personally, I love when names and places are chosen for special, hidden reasons, so I wanted to include those in my story. I wanted the bird's name to mean something, especially since I was giving her a Hawaiian name. I eventually landed on Iolana which means "soaring bird" in Hawaiian. The process of finding the name was a long one. I originally found four names and had the six names of the actual birds released in September of 2019.

The four that I picked were Iolana (Soaring Bird, Female), Lanakila (Victory, Female), Akamai (Smart, Clever, Intelligent, Male), Manu (Bird, Male). I chose these names based on their connections to the ʻAlalā. "Victory" for their victory of returning to the wild. "Smart, clever, and intelligent" for the ʻAlalā's intelligence and innate ability to use tools. "Bird" for the fact that they are birds. "Soaring bird" because the ʻAlalā were once again soaring through the forests of Hawai'i. Iolana also had a bit of irony because another translation means "soaring hawk" and the only natural predator of the ʻAlalā is the ʻIo, or Hawaiian Hawk. Of these names, I decided that Iolana was the best because it was female, had special meaning, and was the easiest to pronounce of all of them.

In September of 2019, six more birds were released. Their names were ʻAlohi (Shining, Brilliant, Male), Kana'i (Conqueror, Victor, Male), Eola (Female), Keolamauloa, Kamanuolamau, and Kalā'au. The last three names on this list were discounted immediately based on their difficulty to pronounce. Of the remaining names, I thought that ʻAlohi would be

the easiest to pronounce. It also had the best meaning of the ones I could find meaning for because “brilliant” could be interpreted as intelligent.

In the end, I decided that Iolana was the best fit for my book. I was not comfortable using the actual name of a released bird because the more my story developed, the more fictionalized it became. Because of this, it felt wrong to have the name of a real bird included in the story. I also felt strongly that the main character was female and the name ‘Alohi was masculine. My final reason for choosing Iolana was I enjoyed the meaning of it more, which was very important to me.

Naming the scientist was slightly easier for me. I first looked for the names of people who actually worked at the Keauhou Bird Conservation Center. The only name I was able to find was Dr. Alison Greggor. I considered using this name but decided against it for two reasons. The first was similar to my reasons for not using the name of the released birds. Because the story was becoming more fictionalized it felt wrong to include the names of people who actually exist. The second was that I would be using her first name in the book and she spells Alison the same way that I do. I wanted to put a bit of me into the story but that felt a little too literal for comfort. I went back to the original list of Hawaiian names that I had found while looking for Iolana’s name and saw the name Nalani on the list. Nalani means “quiet skies.” This meaning spoke to me because the ‘Alalā were known for their call by the Hawaiians. By working to help restore the ‘Alalā to Hawai’i, the researcher was looking for a way to fill the quiet skies with the call of the ‘Alalā once again. With this meaning, I had to pick Nalani to be the researcher in the story.

What I Learned

With my thesis, I struggled a great deal, but I learned just as much. One of the biggest things that I struggled with was doing a creative project. Because I am majoring in a hard

science, this type of project is far outside of my comfort zone. I am used to writing 10-15-page research papers, the kind of papers where you have a source for almost every paragraph, if not more. That was what I had in my head that my thesis had to look like, even as a children's book. It was frustrating that I did not have what I considered "enough" done when each draft came due. For example, with the first draft, I had a total of one page on a Word document written. While that one page represented a third of my book, it felt lacking. It felt like what I was doing was nowhere near enough to qualify as a thesis. It took many conversations with Professor Dalton for me to come to terms with the work I was doing. Overcoming this mental block was a challenge but it helped me learn not to compare myself to internal expectations. I had become convinced that I knew what a thesis was supposed to look like, and I became obsessed with that image. Working through this project allowed me to work past this obsession to complete the thesis.

I learned how to work through the perfectionist. There were several times where I became frozen with what I was working on because it was not good enough. I had to learn to silence the editor in my head that told me the last sentence needed to be rewritten. I also learned this while working on the drawings. I am not an artist. I wanted to have illustrations to go with my book but was frustrated that they were not turning out the way I expected. Through this, I learned to step back and take a breath before continuing.

Through this thesis, I was able to learn to adapt to change. This is something that I had been doing my entire life, but it became very apparent while working on this project. I had to change direction several times and learn how to adapt my project to the new ideas.

In addition to what I learned about myself, I also learned about what goes into the preservation of a species. There are many ups and downs associated with the process. When I started this project there were 27 ʻAlalā living in the wild. Recently I came across a news article

saying that there were only ten left. This is due to predation and some of the birds have just gone missing. This setback, while heartbreaking, is not the end of the project. Currently, steps are being taken to release more birds in 2022 ("'Alalā Project Looks to the Next Stage of Recovery," 2020). These are not the only setbacks that the birds have faced and there will be many more. While I knew about these setbacks with enough time to include them in my book, I wanted to write about them for their success. I felt that it would bring hope to the topic of conservation. With this new information it does not just bring a message of hope, but it also brings a lesson of perseverance. Looking at the 'Alalā's journey I have learned that if there is something that I believe in that I should never give up on it, just as the researchers in the 'Alalā Project have not given up on the 'Alalā.

References

About Us. (2017). Retrieved April 8, 2020, from https://dlnr.hawaii.gov/alalaproject/about-us/

‘Alalā Project Looks to the Next Stage of Recovery. (2020, March 12). Retrieved April 1, 2020, from https://dlnr.hawaii.gov/alalaproject/2020/03/12/press-release-‘alala-project-looks-to-the-next-stage-of-recovery/

Culliney, S., Pejchar, L., Switzer, R., & Ruiz-Gutierrez, V. (2012). Seed dispersal by a captive corvid: the role of the ‘Alalā (Corvus hawaiiensis) in shaping Hawai’i’s plant communities. *Ecological Applications*, *22*(6), 1718–1732. doi: 10.1890/11-1613.1

FAQs. (2017). Retrieved April 1, 2020, from https://dlnr.hawaii.gov/alalaproject/faqs/

Fitz-Randolph, J. (1980). *How to write for children and young adults: a handbook*. Boulder, CO: Johnson Publishing Company.

Hawaiian Culture. (2017). Retrieved April 1, 2020, from https://dlnr.hawaii.gov/alalaproject/about-‘alala/hawaiian-culture/

Karl, J. E. (1994). *How to write and sell children’s picture books*. Cincinnati, OH: Writer's Digest Books.

Ohio's Learning Standards and Model Curriculum for Science. (2019, May). Retrieved from http://education.ohio.gov/Topics/Learning-in-Ohio/Science/Ohios-Learning-Standards-and-MC

Roberts, E. E. M. (1981). *The children’s picture book: how to write it, how to sell it*. Cincinnati, OH: Writer's Digest Books.

Rutz, C., Klump, B. C., Komarczyk, L., Leighton, R., Kramer, J., Wischnewski, S., … Masuda, B. M. (2016). Discovery of species-wide tool use in the Hawaiian crow. *Nature*, *537*(7620), 403–407. doi: 10.1038/nature19103

Seuling, B. (1984). *How to write a children's book and get it published*. New York, NY: Macmillan Publishing Company.

U.S. Fish and Wildlife Service. (2009). *Revised Recovery Plan for the `Alalā (Corvus hawaiiensis)*. Retrieved from https://ecos.fws.gov/docs/recovery_plan/090417.pdf

References Consulted

[‘Alalā Eggs in Incubator] [Photograph] (2012). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.267222413349565/267238700014603/?type=3&theater

[Baby ‘Alalā in Nest] [Photograph] (2012). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.267222413349565/267238770014596/?type=3&theater

[Costumed Researcher Feeding Baby ‘Alalā] [Photograph] (2017). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.1744204618984663/1744204425651349/?type=3&theater

[Feeding Station] [Photograph] (2017). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.328039060601233/1722181794520279/?type=3&theater

[Historical Range Map] [Photograph] (2019). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.328039060601233/2567488229989627/?type=3&theater

[Hō’awa Fruit] [Photograph] (2012). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/HawaiiNei/photos/a.154832747970706/181186218668692/?type=3&theater

[‘Ie’ie fruit] [Photograph] (2019). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.328039060601233/2674021926002923/?type=3&theater

Kingsley, R. (2018, May 16). *Return to the wild: ‘Alalā reintroduction efforts* [Lecture notes]. Hilo, HI, United States.

[Mosquito on Hawaiian Bird’s Eye] [Photograph] Retrieved from https://abcbirds.org/wp-content/uploads/2017/03/Apapane-with-mosquito_Jack-Jeffrey.jpg

[Nesting ‘Alalā] [Photograph] (2019). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.328039060601233/2627191464019303/?type=3&theater

[‘Ōlapa Fruit] [Photograph] (2016). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.328039060601233/1142161389188992/?type=3&theater

[Release Flight Aviary] [Photograph] (2016). ‘Alalā Project Facebook. Retrieved from https://www.facebook.com/alalaproject/photos/a.328039060601233/1240279562710507/?type=3&theater

The ‘Alalā’s Journey

Page 1

Nalani watched as Iolana prepared to go out into the unknowns of the Hawaiian forests. Soon she would be flying off into the tree line. Nalani couldn’t help but think back to when Iolana was no more than a newly hatched ‘Alalā (Figure 1).

Figure 1. ‘Alalā flying into the forest with scientist’s head in corner.

Page 2

Iolana hatched from a small blue-green egg in a special box called an *incubator*. This box was designed to keep her nice and warm while she grew up (Figure 2).

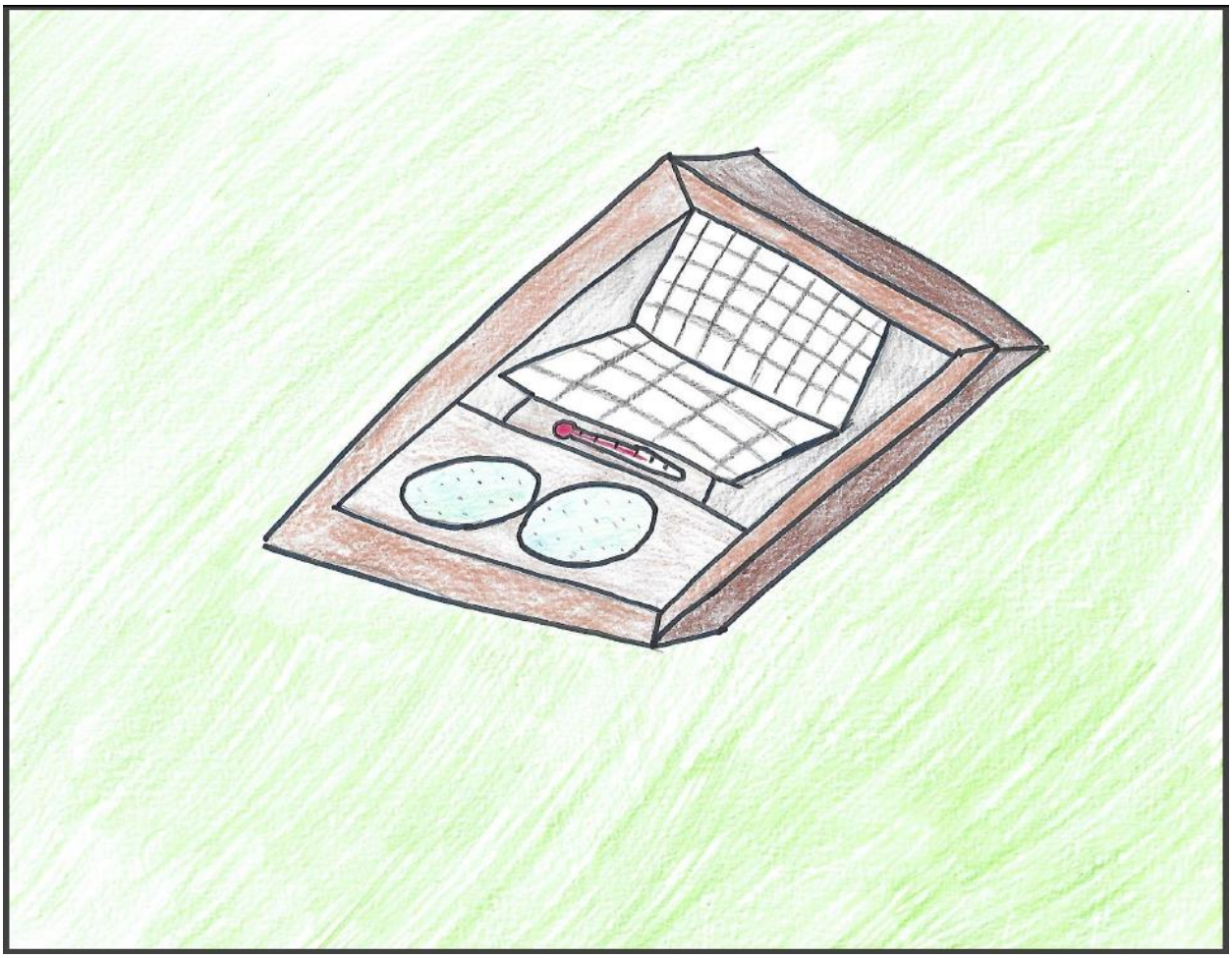

Figure 2. Incubator with eggs inside.

Page 3

Everyone at the Keauhou Bird Conservation Center was very excited for her to hatch because the ʻAlalā is a very rare and special bird (Figure 3).

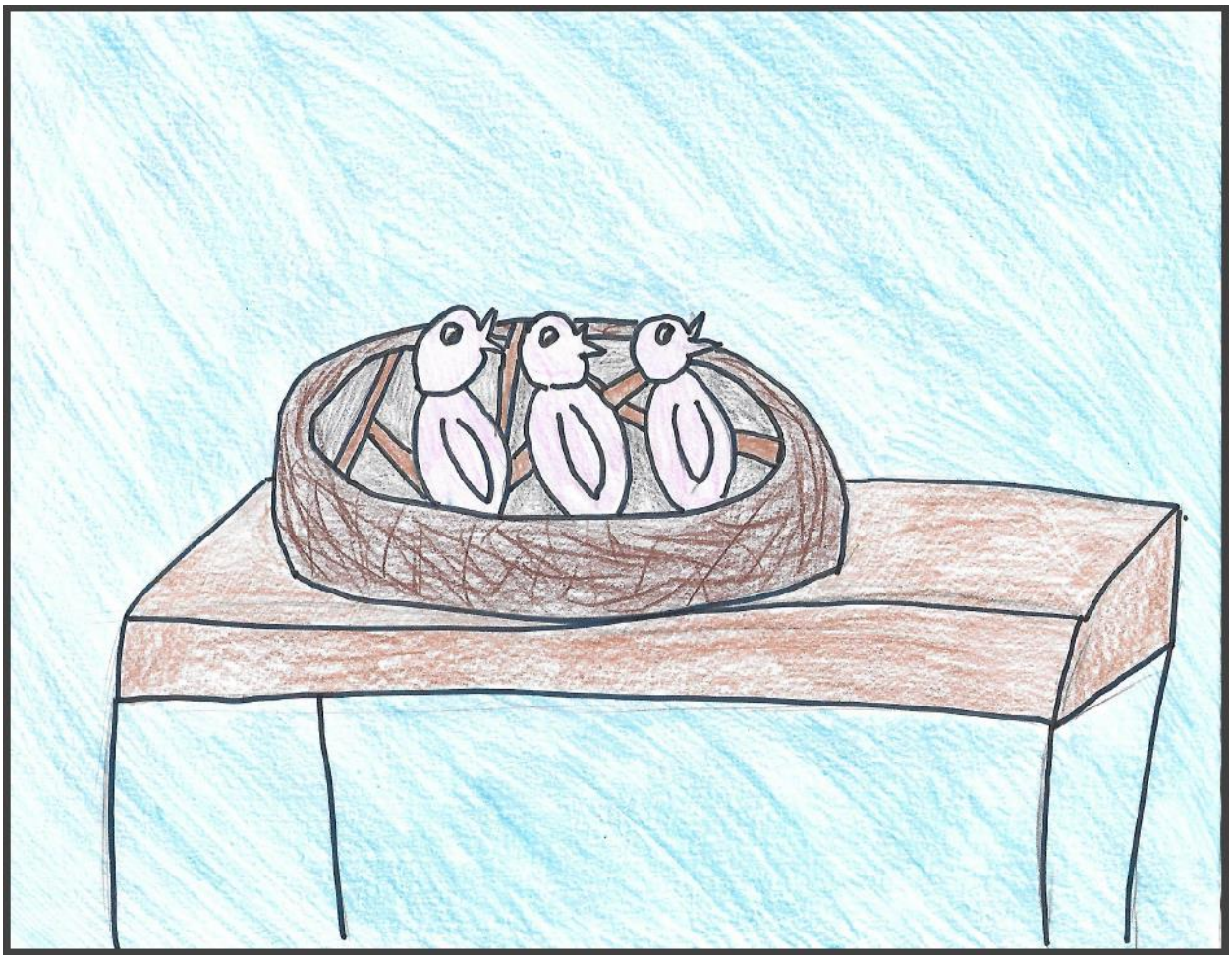

Figure 3. Nest with baby ʻAlalā.

Page 4

Long before Iolana was born, her ancestors were found all over the island of Hawai'i. But then the ʻAlalā almost disappeared forever. Now they are only found in human care (Figure 4).

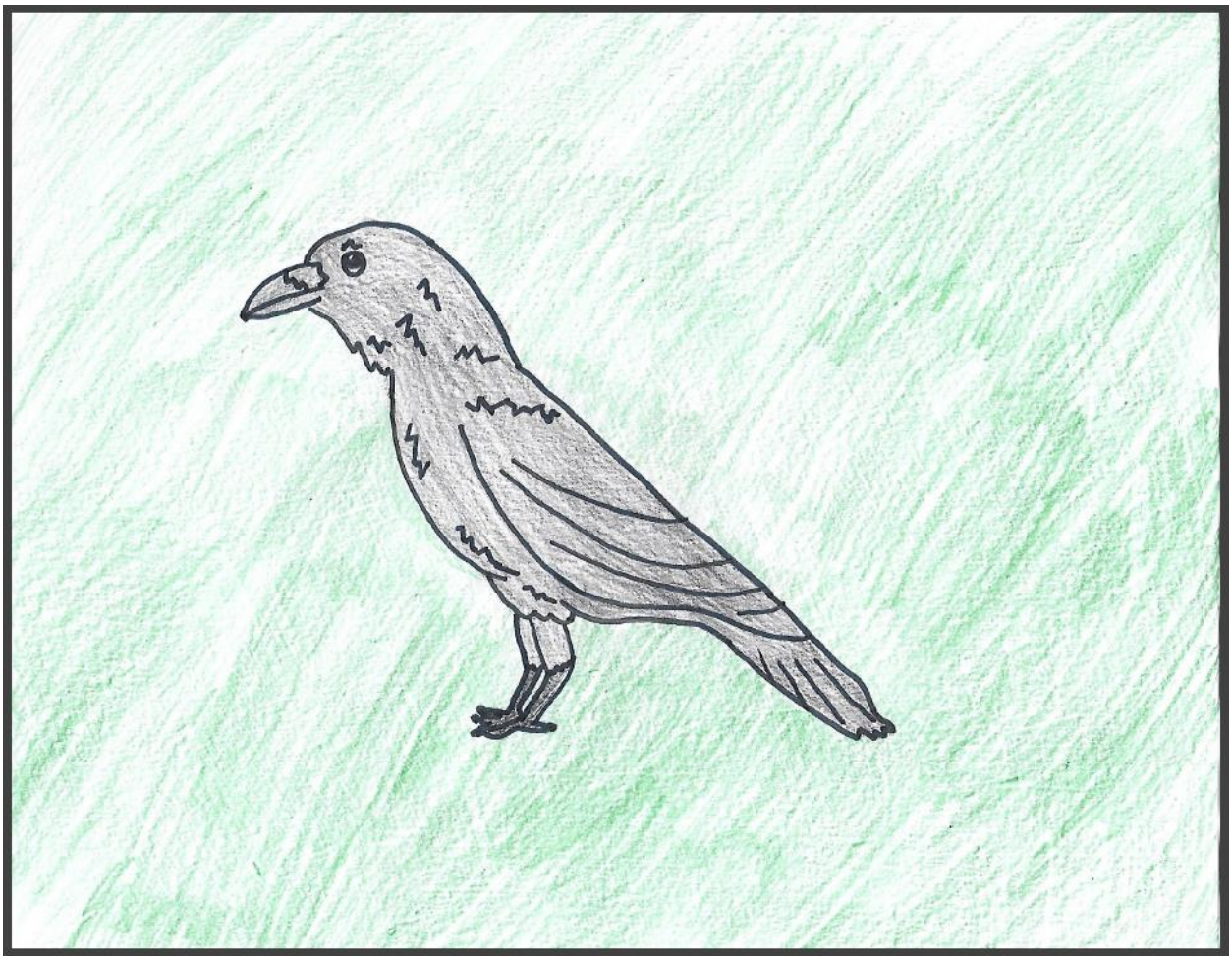

Figure 4. Picture of adult ʻAlalā.

Page 5

The ‘Alalā is also known as the Hawaiian Crow. This is because they are the only member of the *corvid family* to still be living in Hawai’i. The corvid family includes birds such as ravens, crows, and blue jays. The ‘Alalā evolved on the Hawaiian Islands and are only found there (Figure 5).

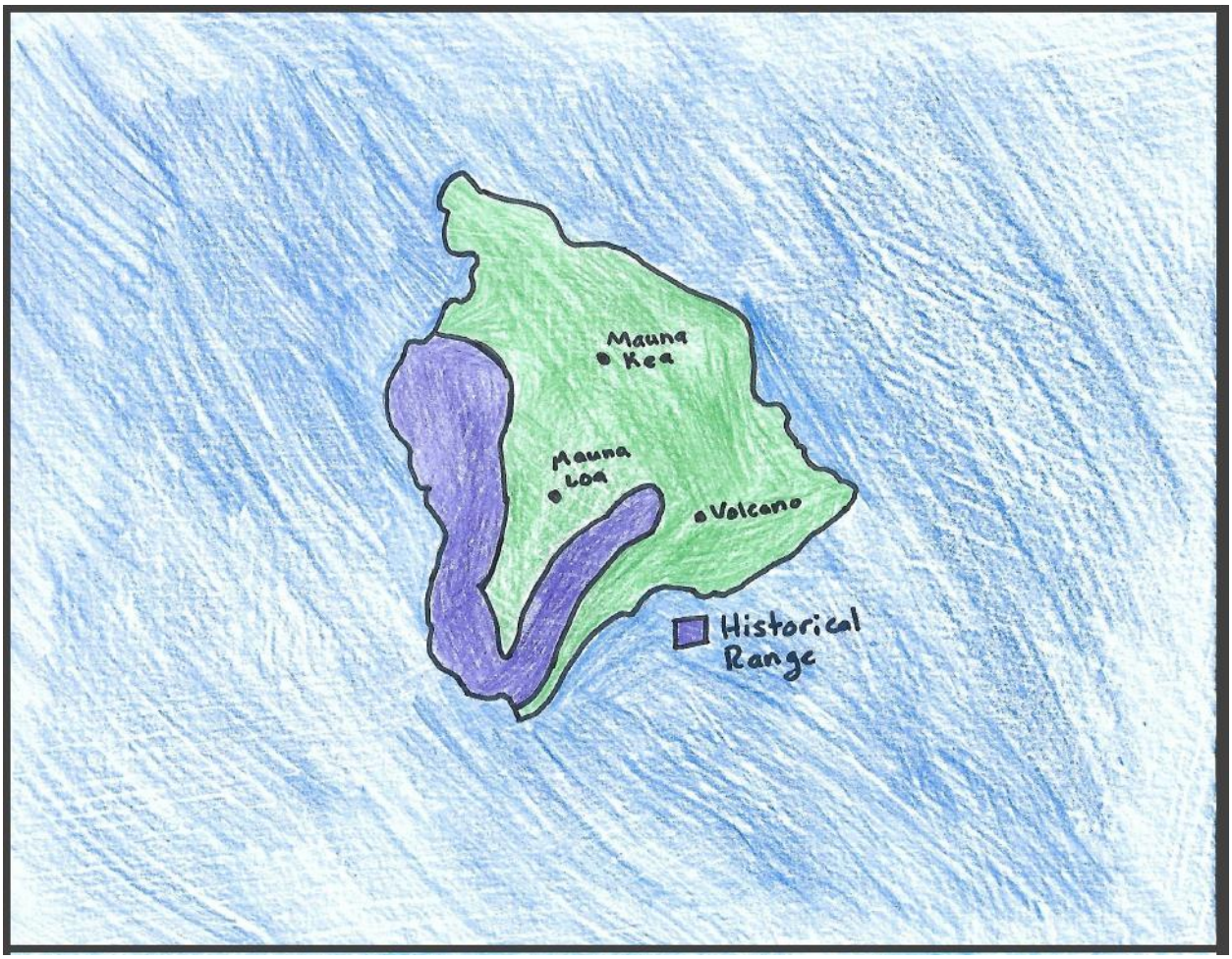

Figure 5. Map of Hawai’i showing historical range of ‘Alalā.

Page 6

Before humans came to the Islands, the ʻAlalā only had one *predator* to worry about but humans brought over new animals such as mongoose and cats (Figure 6).

Figure 6. Boat with introduced animals on board.

Page 7

These mammals had never been on the islands and liked to eat birds such as the ʻAlalā as well as their eggs (Figure 7)

Figure 7. Picture of cat stealing eggs from a nest.

Page 8

Humans also brought mosquitoes that carried diseases. These caused the ʻAlalā and other birds to get very sick (Figure 8).

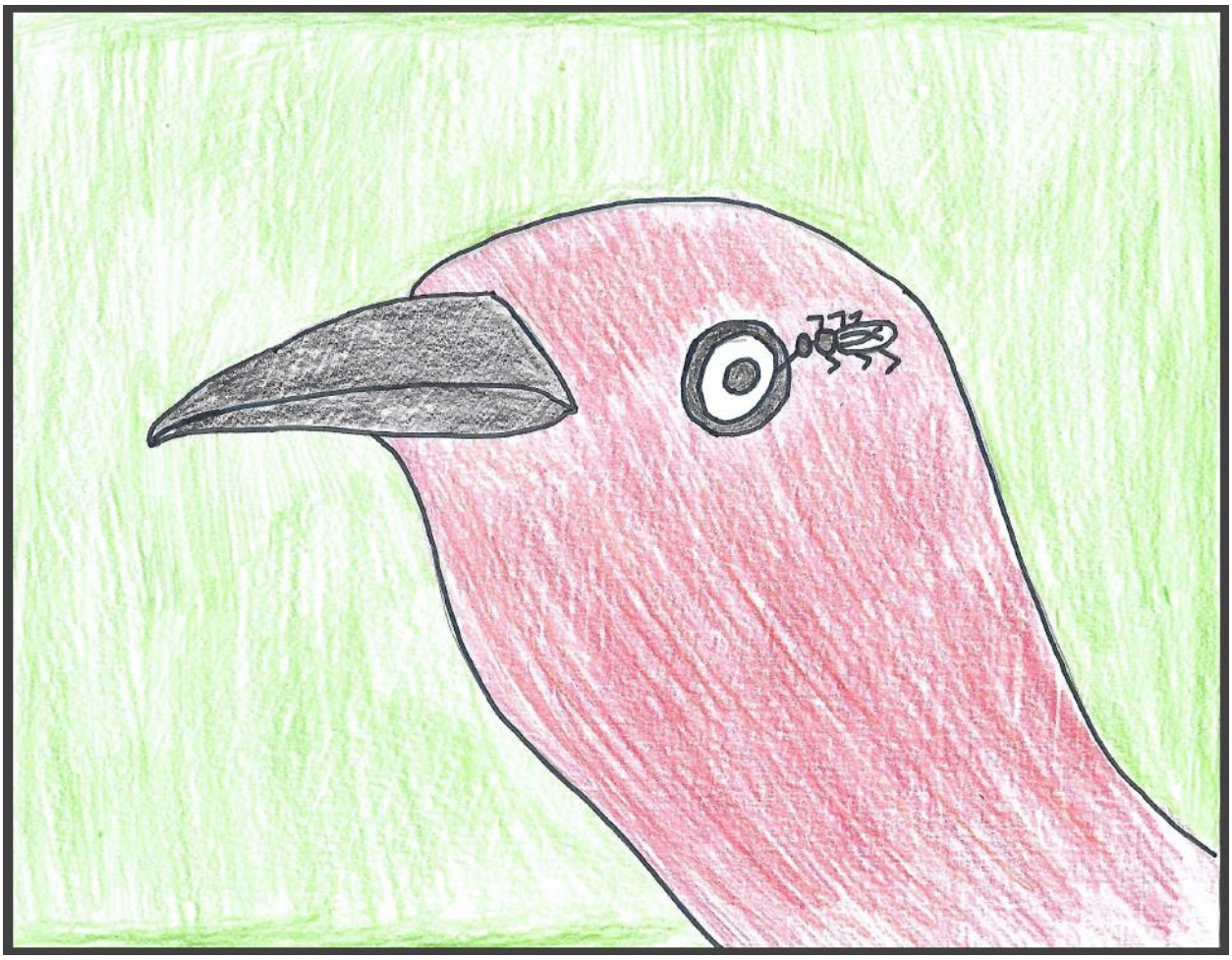

Figure 8. Picture of bird with mosquito on eye.

Page 9

As more people came to Hawai’i to live, they needed to cut down trees to build houses and space for farm animals to live. After the trees were cut down, the ‘Alalā had nowhere to live (Figure 9).

Figure 9. Bulldozer cutting down trees.

Page 10

Luckily, some scientists noticed that there were fewer and fewer ‘Alalā around so they decided to help them out (Figure 10).

Figure 10. Scientist looking confused (question marks around head).

Page 11

They went in search of the remaining ‘Alalā. They were able to find nine birds. Those birds were then brought into *captivity*. It was official, there were no longer ‘Alalā in the wild (Figure 11).

Figure 11. Birds in a zoo exhibit type setting.

Page 12

After Iolana hatched at the Keauhou Bird Conservation Center, she needed someone to take care of her. Nalani would wear a special costume with a puppet on the hand to feed Iolana and check-in to make sure she stayed healthy (Figure 12).

Page 13

Nalani helped raise Iolana for forty days until she was big enough to leave her nest (Figure 12).

Figure 12. Baby ʻAlalā in a nest being fed by a human in a bird costume.

Page 14 – 15

Iolana worked hard learning how to fly. Every day she got a little bit better and eight short months later she was flying like a pro (Figure 13).

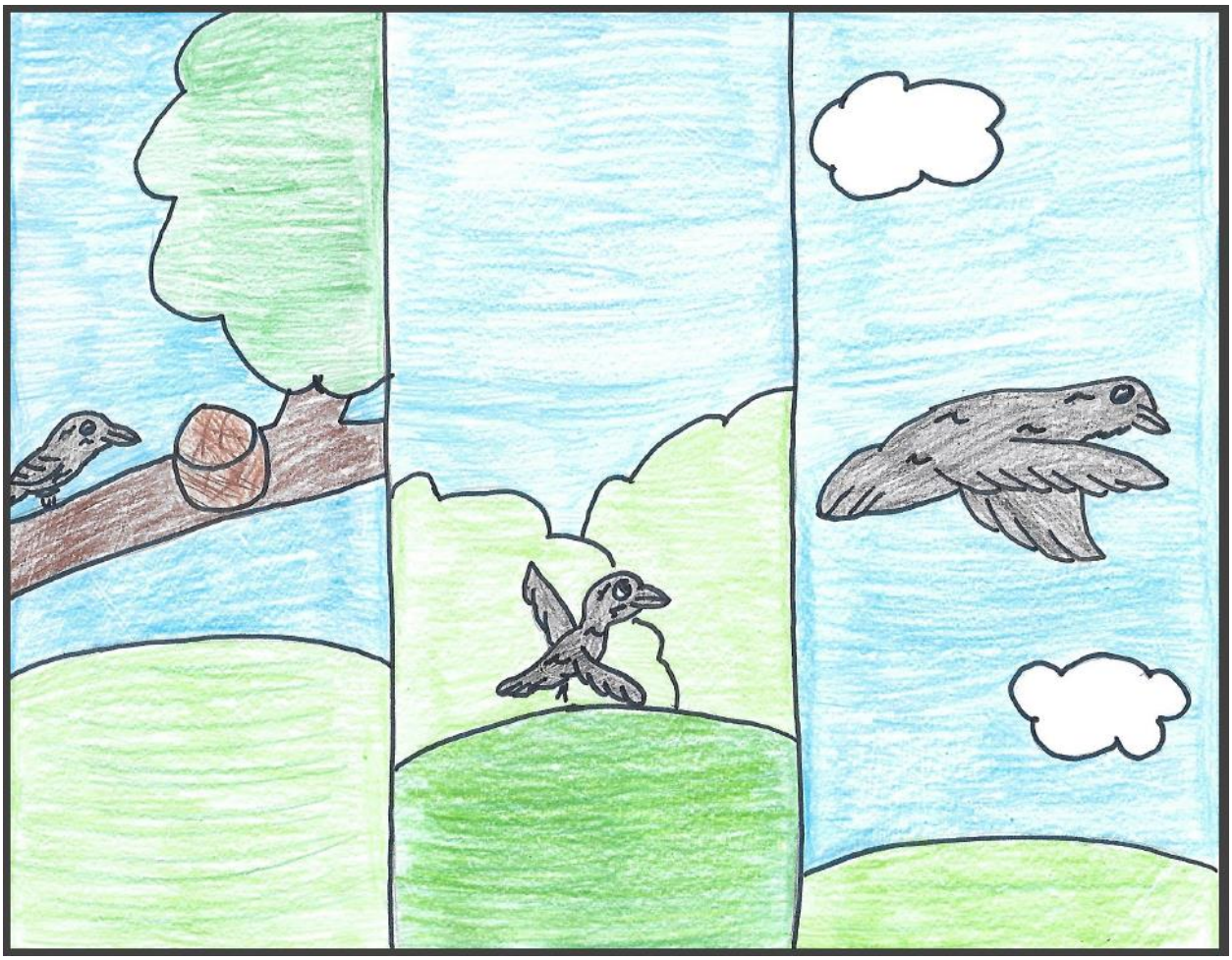

Figure 13. Three panels showing Iolana in varying stages of flight. 1) Bird getting ready to jump out of the nest. 2) Bird hopping on the ground with wings spread. 3) Bird succeeding in flight.

Page 16

At eight months old, it was time for Iolana to learn how to find food. ʻAlalā eat more than 30 different types of fruit, including the native fruits Ōlapa, ʻIeʼie, and Hōʼawa. When the ʻAlalā eat the fruit they then spread the seeds to different parts of the forest. This makes it so the plants can grow in new places (Figure 14).

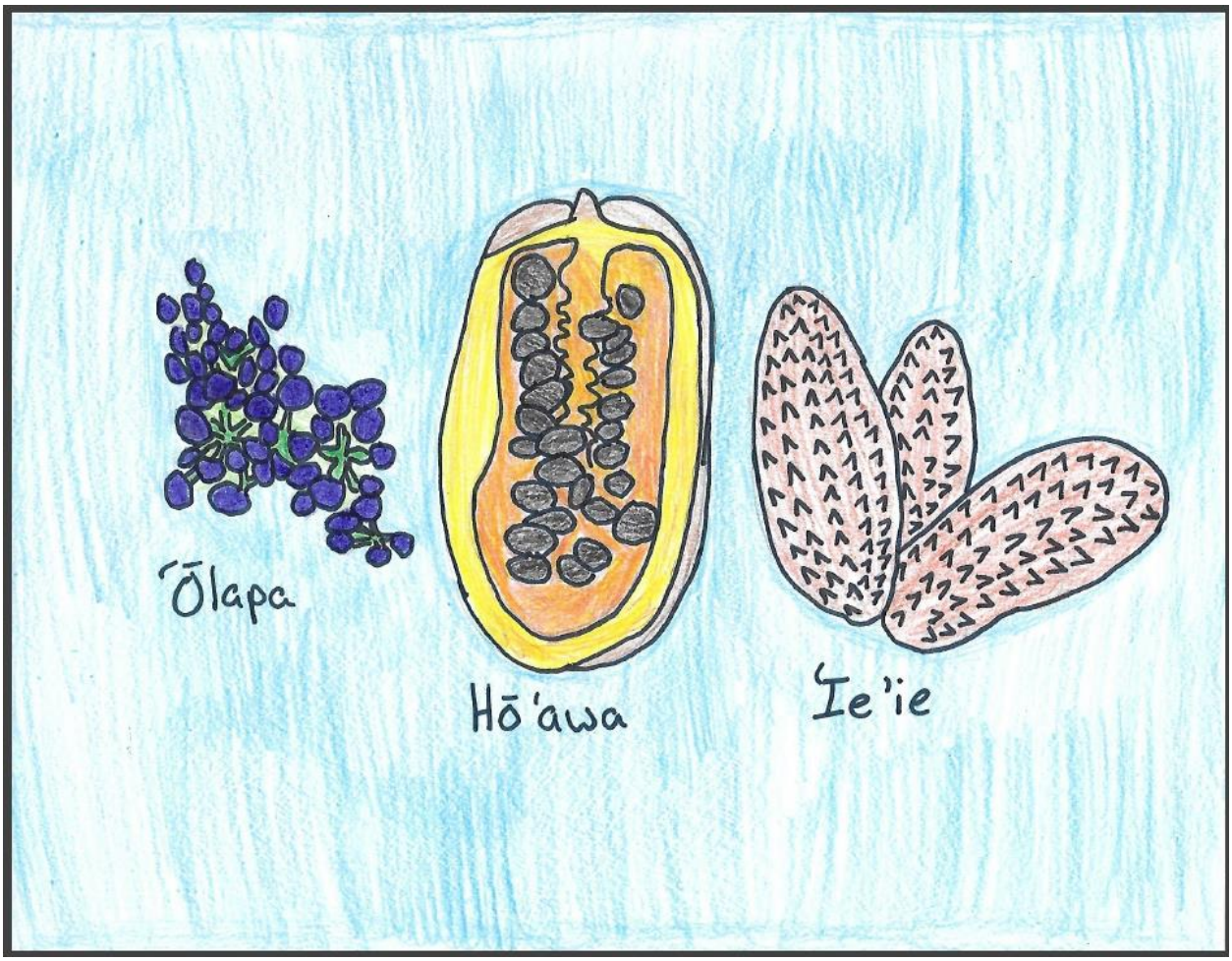

Figure 14. Pictures of the various fruit that ʻAlalā eat.

Page 17

Iolana doesn't just eat fruit. She also enjoys insects, flowers, and sometimes other birds' eggs. Iolana and other ʻAlalā are very smart. They can use sticks as tools to help them find insects inside logs (Figure 15).

Figure 15. ʻAlalā using sticks to fish insects out of a log.

Page 18

Nalani and the other scientists at the Keauhou Bird Conservation Center help raise the ‘Alalā so that one day they can be placed back into the wild forests of Hawai’i (Figure 16).

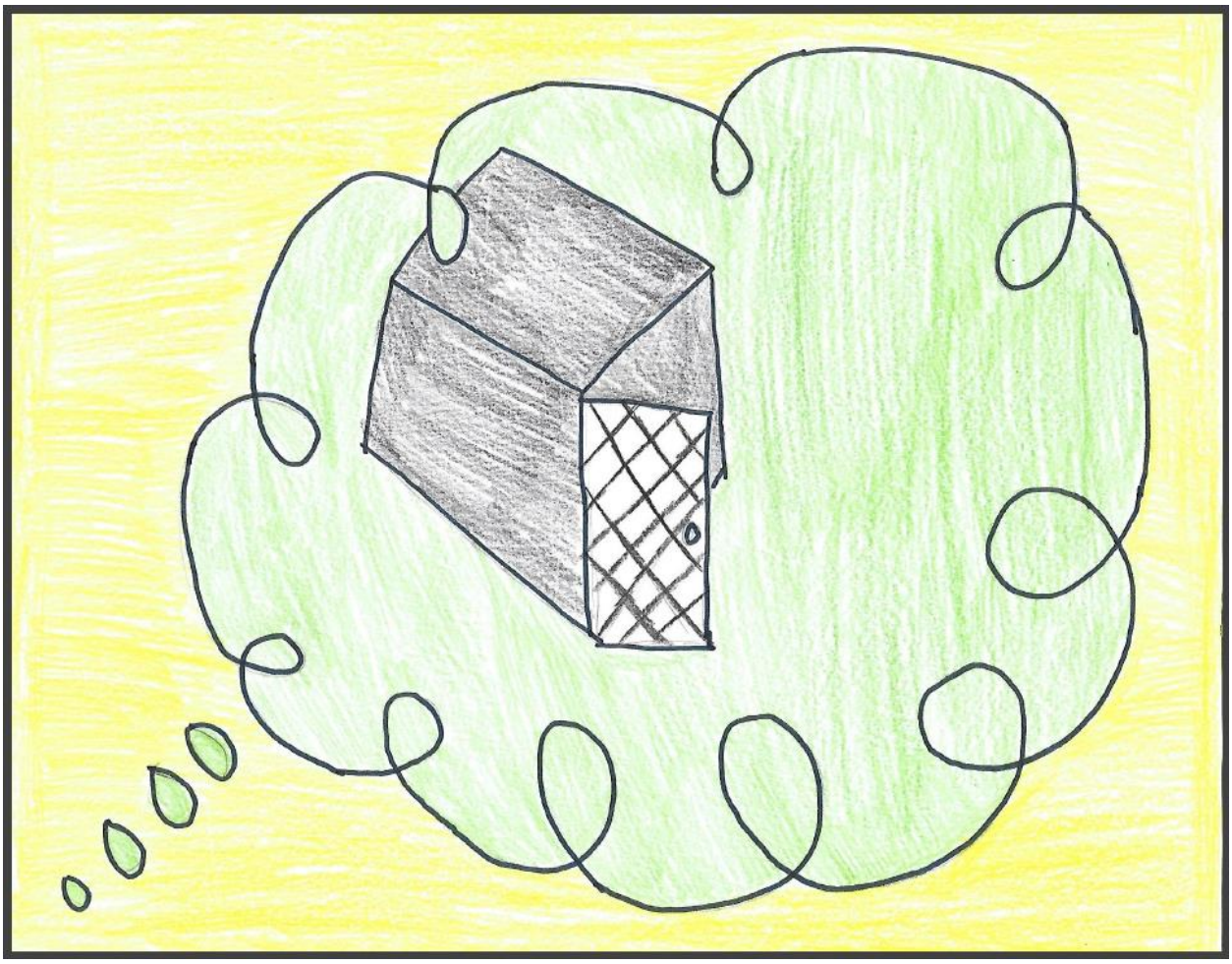

Figure 16. Thought bubble with the picture of a cage door open.

Page 19

In 2016 they tried releasing the first set of birds into the wild. Five of Iolana's older friends were able to go out and explore the forest that hadn't seen ʻAlalā in 14 years (Figure 17).

Figure 17. Five ʻAlalā exploring the forest.

Page 20

A couple of months went by, and two of Iolana's friends returned to the Center. The three others unfortunately never came back (Figure 18).

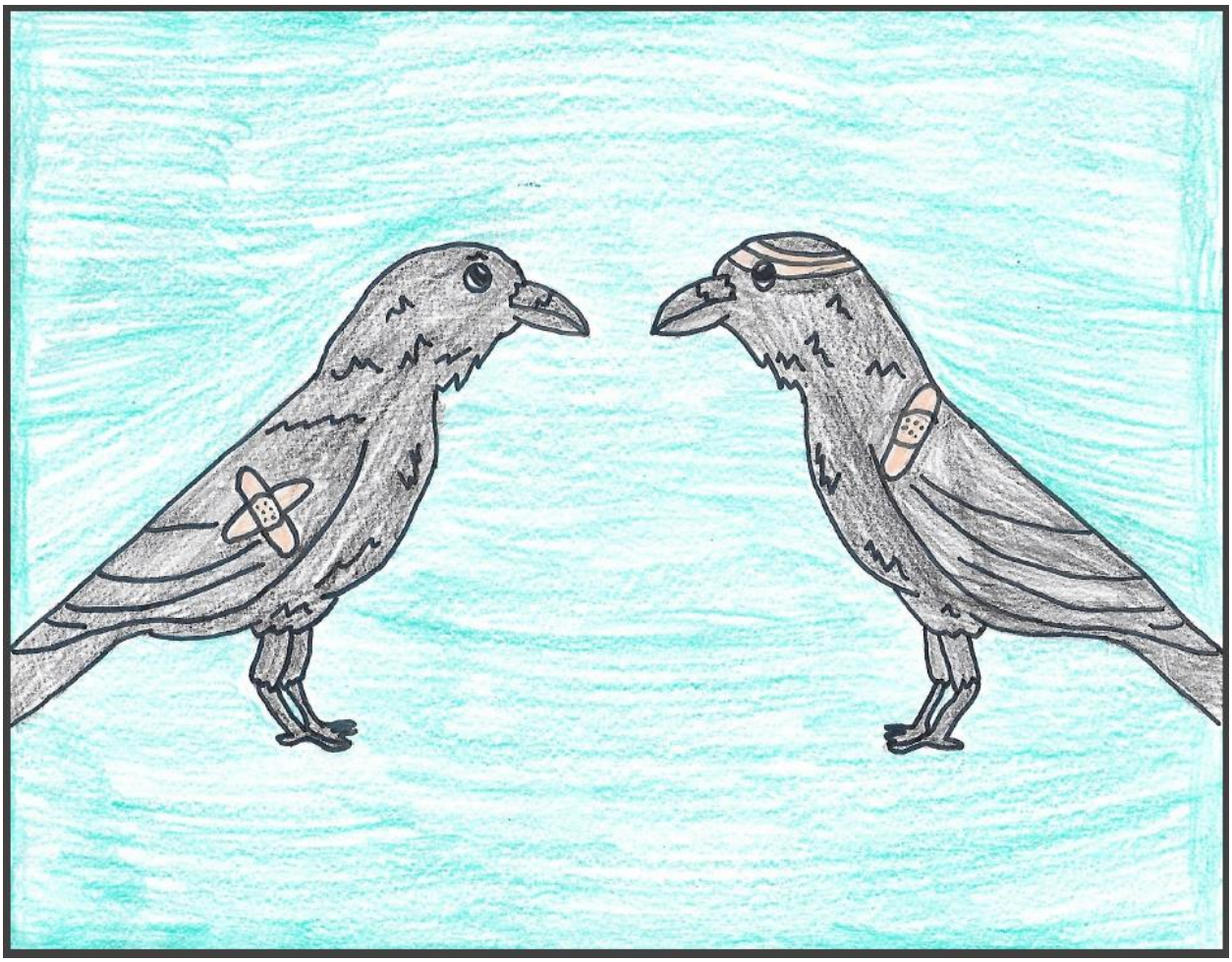

Figure 18. Two birds are shown back in the Center with bandages on their wings.

Page 21

Because none of the birds had been in the wild for such a long time, they had forgotten what a predator was. This left them defenseless against their natural predator, the ‘Io (Figure 19).

Figure 19. Hawk shadow on the top with confused ‘Alalā underneath.

Page 22

The scientists had to come up with a way to teach the ‘Alalā to be afraid of the ‘Io. Luckily, one ‘Io lived at the Pana’ewa Rainforest Zoo (Figure 20).

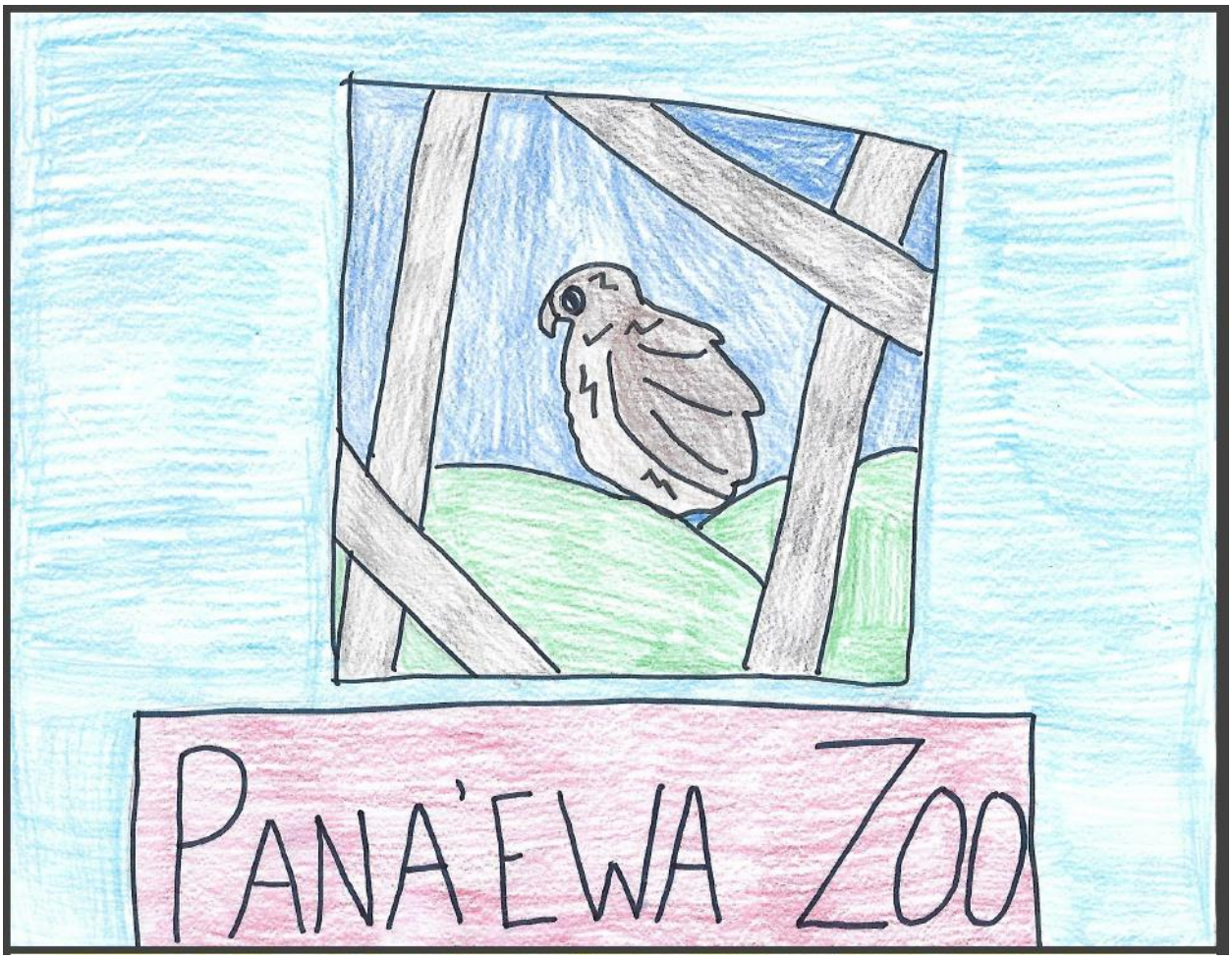

Figure 20. Sign of the Pana’ewa Rainforest Zoo and a caged ‘Io.

Page 23

Nalani and the other scientists borrowed the hawk to help the ʻAlalā learn to associate it with bad things (Figure 21).

Figure 21. “No” symbol with ʻIo in the middle.

Page 24

After spending two years learning everything that she could, Iolana was ready to be released into the forest of the Pu'u Maka'ala Natural Area Reserve. Before she could go out into the world, special equipment needed to be set up (Figure 22).

Page 25

Nalani worked hard to set up feeders that would provide Iolana with extra food. They would also give Nalani a chance to check on Iolana's weight and health (Figure 22).

Figure 22. A picture of the forest with the food station.

Page 26

Finally, the day had arrived. At three years old, it was time for Iolana to go off into the world. She had been preparing for this her entire life and now the time had come (Figure 23).

Page 27

The door to the flight aviary opened and Iolana began to inspect her new surroundings (Figure 23).

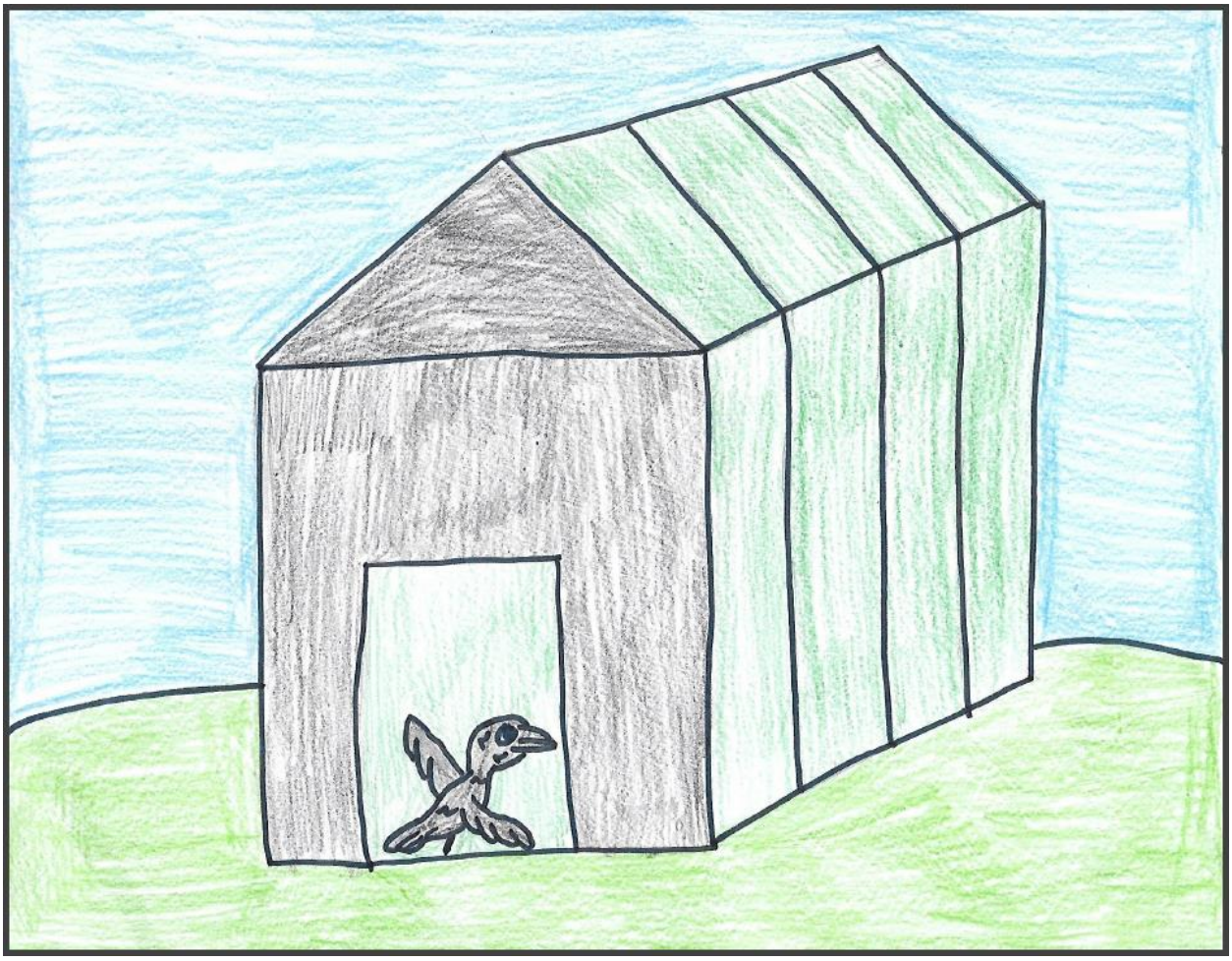

Figure 23. Iolana inspecting the door of the flight aviary, getting ready to leave.

Page 28 – 29

With a loud cry, Iolana flew off into the tree line. There she would join the previously released ʻAlalā. The older birds had begun to build nests in the wild for the first time in almost twenty years. They would serve as role models for Iolana as she started to make her way in this strange new world (Figure 24).

Figure 24. ʻAlalā building nests in ʻŌhiʻa trees.

Page 30

Nalani closed her eyes and smiled at the sound of Iolana's caw. It had been a long time since the forest had heard the haunting cries of the ʻAlalā and it would continue for a long time in the future if she had anything to do with it (Figure 25).

Figure 25. ʻAlalā flying off into the forest.

Page 31

E ho'olā'au hou ka 'alalā: May the 'alalā gather once more in their forest home (Figure 26).

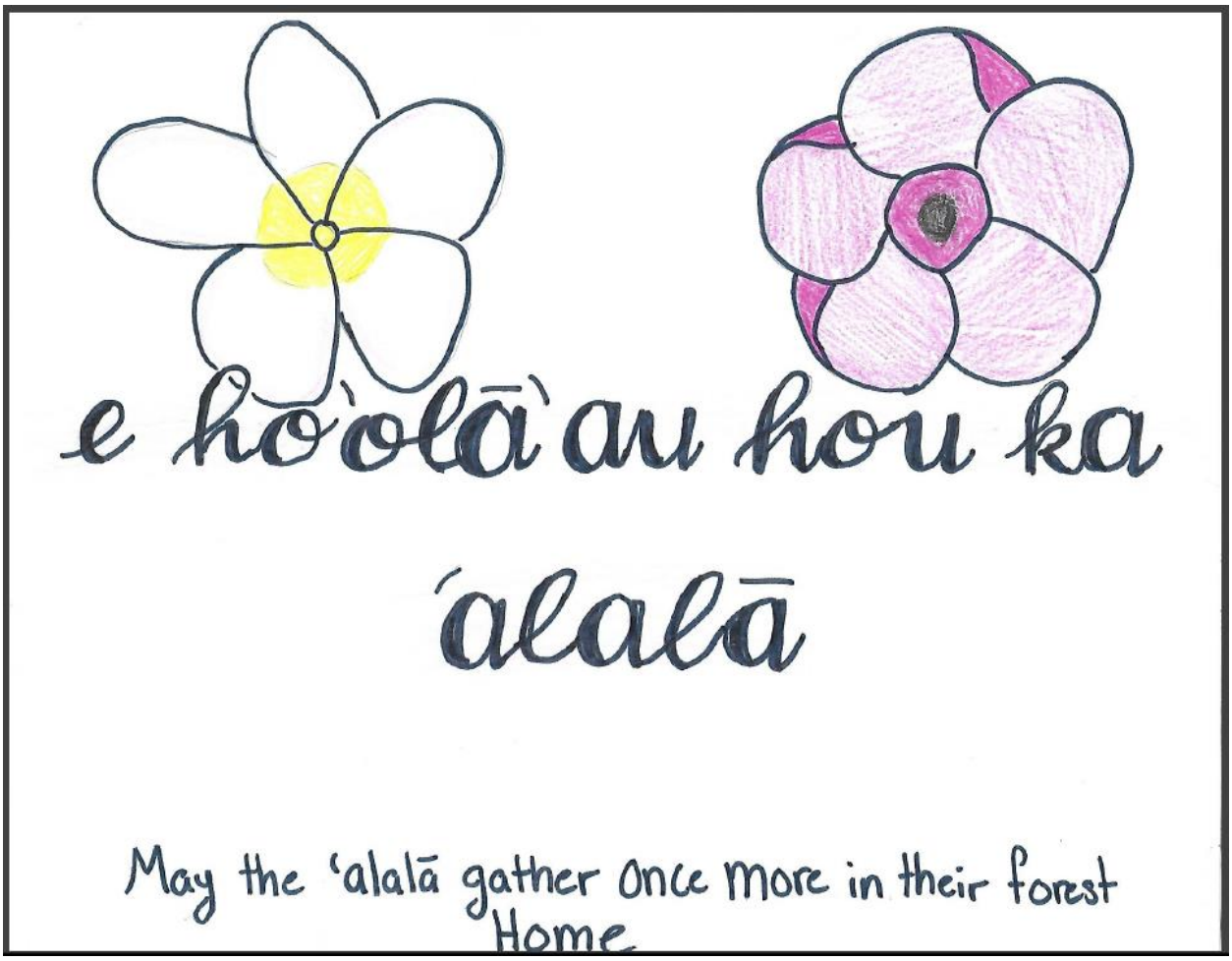

Figure 26. Phrase "e ho'olā'au hou ka 'alalā" which translates to "May the 'alalā gather once more in their forest home" with native flowers in background.

Fun Facts:

- ‘Alalā are about 1.5 feet in length and weigh about 1 pound. That’s about the weight of a football. Males tend to be slightly larger than females

- ‘Alalā may be called the Hawaiian Crow but they look like a smaller version of the common raven that is found in North America.

- The ‘Alalā is the loudest bird in the Hawaiian forest and has been recorded making 34 different calls.

- The ‘Alalā lived in the dry forests that consisted of native trees called ‘Ōhi’a (oh-hee-uh) and koa (see Figure 27). A large number of shrubs provided food and cover to hide from predators.

Figure 27. 'Ōhi'a flower in Akaka Falls State Park. Honomu, HI. May 12, 2018 (top left). Dry forest. Hilo, HI. May 18, 2018 (top right). Koa sapling. Hilo, HI. May 13, 2018 (bottom left). Mature koa tree. Hilo, HI. May 18, 2018 (bottom right).

- The ‘Alalā was last seen in the wild in 2002.

- ‘Alalā have been observed to use tools to reach food without having to be taught.

- The ‘Alalā were kept as ceremonial pets and regarded as a family guardian spirit, *‘aumakua* in Hawaiian.

- The dark color of the ‘Alalā represented unpredictable things. It was considered a warning sign not to continue if an ‘Alalā was seen in the area.

- The ‘Alalā is also associated with Hawaiian dark magic called *‘anā’anā*.

- ‘Alalā are important to the ecosystem of Hawai’i. They spread seeds for native plants by eating the fruit. Without ‘Alalā around these plants struggle to spread and reproduce.

- Invasive predators such as cats have disrupted the ecosystem. When the ‘Alalā had only one predator they were able to continue to reproduce. When new predators such as cats were introduced, the ‘Alalā were being killed faster than they could reproduce. This caused the ecosystem to become unbalanced and the ‘Alalā population to decline.

Facts about Hawaii

- The Islands of Hawaii were formed through volcanic activity. Volcanic eruptions are still happening today. The most recent one was Kīlauea erupting in May of 2018.

- A new volcano is forming under the ocean off the coast of the Big Island of Hawai’i. It is called Lō’ihi (low-EE-hee) and will form a new island millions of years in the future.

- The Hawaiian language only consists of 12 letters: 5 vowels (A, E, I, O, and U) and 7 consonants (H, K, L, M, N, P, and W)
    - The W sometimes is pronounced as a “v”. An example of this is Hawai’i is pronounced “ha-vy-ee” instead of “hah-wy-ee”

- Hawaii is considered a biodiversity hotspot. This means that there is a large variety of unique species found only on the Hawaiian Islands.

- Hawaii is the only place where Honu (hoh-noo), or green sea turtles, will lie on the beach to bask in the sun (see Figure 28).

Figure 28. Green sea turtles lying on beach. Kalaoa, HI. May 24, 2018

- Hawaii has a problem with *invasive species*. These invasive species push the native species out of their habitats. Many Hawaiian species have no protection from the new species because they never had to deal with those types of threats.
    - An example is the Hawaiian raspberry bush that does not have thorns like raspberries found in North America because nothing tried to eat them

- Many of the forests of Hawaii now have more invasive plants than they have native plants. In this picture, only one species is native to Hawaii (see Figure 29):

Figure 29. Forest at Akaka Falls State Park. Honomu, HI. May 12, 2018

- The Nēnē, or Hawaiian Goose, is another species of bird that almost went extinct in the wild. They have successfully been reintroduced into the wild and are now thriving in Hawaii (see Figure 30):

Figure 30. Nēnē in Wailoa River State Park. Hilo, HI. May 12, 2018

Glossary:

Captivity: When an animal is in human care in a facility such as a zoo or aquarium.

Corvid Family: Also known as Corvidae; The group of animals that crows, ravens, rooks, and blue jays belong to.

Incubator: A piece of equipment used to hatch eggs at a controlled temperature.

Invasive Species: Any living creature that is not originally found in an area. This creature causes harm to the environment, economy, and/or human health.

Predator: An animal that hunts and eats other animals.

Hawaiian Words:

ʻAlalā (ah-lah-lah): Hawaiian Crow; to bawl, bleat squeal, cry; a talkative person; style of chant to further project one's voice; a messenger in battle who calls out a chief's commands to his warriors; the cry of a baby.

ʻIo (ee-oh): Hawaiian Hawk.

Iolana (ee-oh-LAH-nah): Soaring bird.

Nalani (nah-LAH-nee): Quiet skies.

Nēnē (nay-nay): Hawaiian Goose.

Annotated Bibliography

‘Alalā Project. (2017). Retrieved January 15, 2020, from https://dlnr.hawaii.gov/alalaproject/

This webpage gives an overview of what the ‘Alalā Project is. The page talks about the bird’s importance to the ecosystem and environment in Hawaii. It also gives an overview of what the organization’s restoration plan is for the ‘Alalā. This will be helpful because it describes one of the organizations that is leading the restoration of the ‘Alalā.

Banko, P. D., David, R. E., Jacobi, J. D., & Banko, W. E. (2001). Conservation status and recovery strategies for endemic Hawaiian birds. *Studies in Avian Biology*, 22, 359-376.

This article discusses the challenges associated with recovery strategies being implemented in Hawaii. This includes things like limited habitats, invasive predators, and diseases. It also talks about some of the social and political factors that are associated with conservation. It discusses these things for three main species, including the ‘Alalā. This could be helpful because it lays out the original recovery strategy for the ‘Alalā. It talks about the hardships associated with captive breeding specifically for the ‘Alalā and it mentions the difficulty that they have with predators. It also talked about factors that need to be taken into consideration for release programs to happen. This can lead me to research these factors more closely and figure out how the authors of the paper dealt with these problems.

Culliney, John L. (2006). *Islands in a Far Sea: The Fate of Nature in Hawaii*. Honolulu, HI: University of Hawaii Press.

Chapters 14 talks about the forest birds in Hawai'i. It goes into detail on many of the different species that can be found in Hawai'i and the factors that lead to the decline of these species. It talks about the introduction of invasive species such as rats, mosquitoes, and pigs. It also goes into the effects that avian malaria, avian pox, and toxoplasmosis have had on the bird population. Chapter 16 goes into more detail about the decline of the ʻAlalā and it gives information about a failed release attempt in the mid-1990s. Other chapters in this book also describe the native habitats that are found in Hawai'i, the formation of the islands, and the threats that the endemic wildlife are facing in general. This will be helpful because it talks about many factors that I hope to include in my project, such as details on the ʻAlalā's decline and what factors lead to it.

FAQs. (2017). Retrieved January 15, 2020, from https://dlnr.hawaii.gov/alalaproject/faqs/

This page gives detailed information on the lifestyle and life history of the ʻAlalā. It gives some information on Hawaiian culture. It also gives an overview of the release plan for the ʻAlalā. This could be helpful because it describes detailed information about the ʻAlalā and gives information about the organization.

Fitz-Randolph, J. (1980). How to write for children and young adults: A handbook. New York: Barnes & Noble.

This book is about writing for children in all genres. There are sections that discuss writing both fiction and nonfiction. The nonfiction section describes how nonfiction can be enjoyed by all ages of children and young adults. It also describes the beginning, middle, and end of a nonfiction article. There are sections about how to think about the audience that is being written for and how to begin plotting out the story. This will be helpful since I am planning on writing a children's book that is in the genre of nonfiction.

Jarvi, S. I., Atkinson, C. T., & Fleischer, R. C. (2001). Immunogenetics and resistance to avian malaria in Hawaiian honeycreepers (Drepanidinae). *Studies in Avian Biology*, 22, 254-263.

This article explains the prevalence of avian malaria in Hawaiian honeycreepers. It gives information about how the disease is spread through non-native mosquitoes. It also describes the symptoms of the disease when a bird is infected. There is also a discussion about the proposed hypothesis of birds becoming resistant to the current strain of parasite. This explanation of the transfer of the disease and potential for birds to become resistant can be helpful as this is one of the issues that impacted the ʻAlalā's initial decline.

Greggor, A. L., Vicino, G. A., Swaisgood, R. R., Fidgett, A., Brenner, D., Kinney, M. E., … Lamberski, N. (2018). Animal Welfare in Conservation Breeding: Applications and Challenges. *Frontiers in Veterinary Science*, *5*. https://doi.org/10.3389/fvets.2018.00323

This paper is about the facility where the ʻAlalā are kept. It describes the reasoning behind the choices made for diet, health care, and species-typical behavior. This paper was written by the head researcher at the Keauhou Bird Conservation Center. The authors describe the choices given to the birds to help them remain "wild" and unimprinted by humans. This paper will be helpful because it describes the conditions at the Keauhou Bird Conservation Center. It will help me get a clearer picture as to what life is like for a captive ʻAlalā.

Kuehler, C. Y. N. D. I., Lieberman, A. L. A. N., Harrity, P., Kuhn, M. A. R. L. A., Kuhn, J. O. P. E., McIlraith, B., & Turner, J. (2001). Restoration techniques for Hawaiian forest birds: collection of eggs, artificial incubation and hand-rearing of chicks, and release to the wild. *Studies in Avian Biology*, 22, 354-358.

This article discusses techniques used to collect eggs, incubate them, and hand-rear the chicks. It then discusses releasing them into the wild. It also has a section of an attempted release in the 1990s of the ʻAlalā and how those birds did in the wild at the time. This article could be helpful because it describes a release that did not fully establish a population of birds in the wild. It also shows that breeding efforts are extensive and require a lot of research in order for them to be successful with all types of birds in Hawai'i.

Recovery. (2017). Retrieved January 12, 2020, from https://dlnr.hawaii.gov/alalaproject/recovery/

This page gives detailed information about the captive breeding program. It also discusses the forest restoration that is being done to help restore their habitat. This could be helpful because it lists some of the recent steps that have been taken to help restore the ‘Alalā to the wild.

Rutz, C., Klump, B. C., Komarczyk, L., Leighton, R., Kramer, J., Wischnewski, S., ... & Switzer, R. A. (2016). Discovery of species-wide tool use in the Hawaiian crow. Nature, 537(7620), 403-407.

This paper reviews the spontaneous use of tools in the ‘Alalā. The authors of this paper examined tool use in juvenile and adult ‘Alalā at the Keauhou Bird Conservation Center. They found that 78% of the birds would spontaneously use tools to get hard to reach food. These birds had no prior instruction on tool use from either humans or older birds. This paper will be helpful for my thesis because it provides detailed information about the ‘Alalā’s abilities. It also shows how the ‘Alalā can be considered incredibly smart and provides another interesting fact about the ‘Alalā.

Seuling, B. (1991). *How to Write a Children's Book and Get it Published.* New York, NY: Macmillan Publishing Company.

This book goes over the various steps needed to write a children's book. This includes finding the right age group. It has detailed descriptions of what an author can write for different ages. There are also instructions on how to specifically write nonfiction for children. This will be helpful since I am planning on writing a children's book that is in the nonfiction genre. For example, it has the rough number of words that are acceptable for basic age ranges (25,000-30,000 for 8-12 years old)

Steiner, W. W. (2001). Evaluating the cost of saving native Hawaiian birds. *Studies in Avian Biology*, 22, 377-383.

This paper looks into how much money it takes to have a conservation program for native Hawaiian birds. It describes how much money is spent each year total to go towards the various programs in place. This is over $9,000,000 yet at the time of the publication (2001), there is only one success story, the Nēnē. It also talks about ways to increase funding with things such as ecotourism. This provides an insight into the cost of conservation which is not something that usually comes to mind but it vital to the survival of these programs.

U.S. Fish and Wildlife Service. (2009). *Revised Recovery Plan for the `Alalā (Corvus hawaiiensis)*. Retrieved from https://ecos.fws.gov/docs/recovery_plan/090417.pdf

This is the official recovery plan for the ‘Alalā put in place by the U.S. Fish and Wildlife Service. It details what steps were taken before 2009 when this revised plan was written and what steps are planned for in the future. It gives an estimation of cost for five years into the future. It also discusses why the ‘Alalā’s population declined in the first place. It lays out what steps need to be taken in the future in order for a wild population of ‘Alalā to be established and considered “successful.” This will be extremely helpful because it lays out the plan to bring the species back from the brink of extinction. It will lay out exactly what steps should have been done. This will help provide a stepping stone from which further, more in-depth, research can be conducted on each step of the recovery process.